

WATER RESOURCES INVESTIGATION

QUINCY, MASSACHUSETTS

COASTAL STREAMS

PLAN OF SURVEY



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

MARCH 1973

PLAN OF SURVEY
WATER RESOURCES INVESTIGATION
QUINCY, MASSACHUSETTS - COASTAL STREAMS
FOR
FLOOD CONTROL AND ALLIED PURPOSES

PREFACE

This Plan of Survey sets forth the general procedures to be followed in developing and formulating a plan of improvements for water and related land resources for the Quincy, Massachusetts-Coastal Streams. The plan shows the status, orientation and direction of the survey.

Procedure emphasizes expediting solutions of the more critical water resources needs of sub areas while progressing toward total accomplishment of the study as rapidly as budgetary schedules of funding permit. The New England Division capabilities are being supplemented with services of an A-E consultant.

The Quincy, Massachusetts-Coastal Streams study is referenced as Level C, being a feasibility study of survey scope. It encompasses narrower geographic or analytic scope than Levels A or B. The results of the present study will be available for incorporation in other ongoing study programs with coverage in the Southeastern New England

area. These include the Level B, Southeastern New England Comprehensive Study (SENE), and special investigations in the Northeastern United States Water Supply Study (NEWS). The plan of improvement to be prepared for the Quincy Study will utilize data and information of a general nature from these studies as well as the completed, Level A, North Atlantic Regional Study, but in no way ignore the especially urgent needs for flood control in the Quincy Coastal Stream area.

FEBRUARY 1972 STORM
HAYWARD CREEK WATERSHED



SOMEONE SAID 'GET A BOAT' - Edward Trask of Needham sits, soaked and shivering, atop his car after it was trapped in a massive puddle on West Howard St., Quincy, in wake of yesterday's storm which pelted area with heavy rain. *Boston Globe Photo*



HELP! - Edward Trask of Needham sits on top of his waterlogged car on Howard Street, East Braintree, flooded under three feet of water yesterday. Behind him is the Moose Hall, which was inundated to a depth of six or eight inches.

*Quincy Patriot
Ledger Photo*

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Study Area Map (Follows text)

Aerial Photograph of Study Area (Follows text)

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A. AUTHORITY FOR STUDY

1. BACKGROUND. - A report of reconnaissance scope under the provisions of Section 205 of the 1948 Flood Control Act, as amended, was completed in November 1970, presenting the findings of a preliminary study of the Quincy area. The study revealed that further detail studies are feasible and local protection works may be justified but would exceed the \$1 million cost limitation on Section 205 Authority. The Mayor of Quincy subsequently requested further studies for flood control.

2. RESOLUTION. - The Honorable James A. Burke, Representative of the 11th Congressional District in Massachusetts sponsored a Resolution adopted 2 December 1970 by the Committee on Public Works of the House of Representatives, United States. The Resolution, which extended the Quincy area of study to include portions of the towns of Braintree and Milton, reads as follows:

"That the Board of Engineers for Rivers and Harbors is hereby requested to review the reports on Land and Water Resources of the New England-New York Region, transmitted to the President of the United States by the Secretary of the Army on April 27, 1956, and subsequently published as Senate Document Numbered 14, Eighty-fifth Congress, First Session and other pertinent reports, with a view to determining the advisability of improvements on Furnace Brook, Hayward Creek and Town Brook, all coastal streams within the city of Quincy and the adjoining towns of Braintree and Milton, Massachusetts, in the interest of flood control and allied purposes."

B. EXISTING PHYSICAL CONDITIONS

3. THE STUDY AREA. - Detail knowledge of the study area developed during preliminary investigations embraces the portion of eastern Massachusetts drained by three coastal streams: Furnace Brook, Town Brook and Hayward Creek. The area includes most of the city of Quincy totalling about 6,000 acres, bounded by the Neponset River Basin on the northwest and southwest; the Mill River on the south, and Fore River and Town River Bay on the east and northeast. The area covers approximately 3,950 acres of Quincy, 1,700 acres of Braintree and 350 acres of Milton. None of the streams support navigation.

4. FURNACE BROOK. - Furnace Brook, with a drainage area of 2,400 acres, originates in the city of Quincy, in the Blue Hills Reservation. The upper watershed is primarily undeveloped, hilly, wooded terrain with a relatively steep channel gradient. In the lower watershed, the brook flows in a system of open channels and conduits through flat, medium density residential areas of West Quincy and Wollaston to its terminus at Black's Creek tidal estuary. Cunningham Brook, a primary tributary of Furnace Brook, originates in the town of Milton and flows through sparsely developed to medium developed land to join Furnace Brook at Quarry Street, a distance of nearly 2 miles. Cunningham Brook has a drainage area of about 600 acres. The total length of Furnace Brook is about 4 miles. Of the 2,400 acres in the watershed, 2,050 are located in the city of Quincy and 350 acres in the town of Milton.

5. TOWN BROOK. - Town Brook, with a drainage area of about 3,000 acres, is the largest stream flowing through Quincy. Town Brook rises in the Blue Hills Reservation of Quincy and Braintree, flows southeasterly for 1-1/2 miles to Old Quincy Reservoir - also known as Braintree Reservoir - then meanders northerly for about 4 miles through Braintree and Quincy to Town River Bay. The 900-acre drainage area of Town Brook upstream of the Braintree Reservoir comprises nearly one-third of the watershed. This area is about 40-percent developed and drains part of the South Shore Plaza shopping center. The undeveloped portion includes extensive swampland. The watershed below the dam to Elm Street and School Street is 50 to 90-percent residential and a

mixture of commercial and industrial properties. The remaining area downstream, through Quincy Center, is thickly settled comprising primarily industrial and commercial properties. Of the 3,000 acres in the watershed, 1,725 acres are located in Quincy and 1,275 in Braintree.

6. HAYWARD CREEK. - Hayward Creek originates in Braintree, east of Commercial Street. The Creek flows through a swampy area to Hayward Pond, sometimes known as Eaton's Pond. The area above the pond is gently rolling and mostly undeveloped with the exception of a few stone quarries. However, considerable commercial and residential development is currently underway in the area. The creek leaves Hayward Pond through a 12-inch outlet and flows through a system of open channels and closed conduit crossing the General Dynamics Shipyard before discharging into Fore River and the ocean. The area below Hayward Pond is heavily developed with residential, commercial and industrial properties. The total length of Hayward Creek, including Hayward Pond, is about 1-1/2 miles, and the area of the watershed is about 600 acres. Approximately 425 acres are located in Braintree and 175 acres in Quincy.

7. CLIMATE AND PRECIPITATION. - The study area has a temperate and changeable climate characteristic of its latitude and location in the New England Region. Because of the moderating influence of the Atlantic Ocean and Massachusetts Bay and the variable movements of high and low pressure systems, extremes of either hot or cold weather rarely last long. The average annual temperature of the study area, derived from 30 years of record is 50.7°F. The average annual precipitation is 43-inches, measured at Blue Hills.

8. FLOOD HISTORY. - Five storms have produced major floods in the area in the past 20 years. The first, accompanying hurricane Carol, dropped over 5-inches of rainfall on 10-11 September 1954. Then, the maximum storm of record in the area, hurricane Diane, produced 12.7-inches of rainfall and major flooding in the period 17-19 August 1955. A recurrence of 1955 flood stages would produce an estimated \$1.8 million damages in the study area with the major share of the damages occurring in the city of Quincy. On 17 and 18 March 1968, a slow moving coastal storm caused near

MARCH 1968 STORM
FURNACE BROOK WATERSHED



AWAY ALL BOATS - This was the only way to travel on a once-paved Brook Rd. in Quincy as secondary streams overflowed their banks. The storm was tagged as the worst flood to hit the southeastern section of Mass. in the past 82 years and created new havoc from Worcester to Wellfleet.



WORSENING FLOOD CONDITIONS - Sheldon Street during a 1968 storm. The street lies within the Furnace Brook Drainage system.

MARCH 1968 STORM
TOWN BROOK WATERSHED



PAYSON STREET



BROOK ROAD



DECEMBER 1969 FLOOD - HAYWARD CREEK WATERSHED - QUINCY AVE.



maximum flooding on the streams and \$1 million damages. Even though rainfall was far less than in 1955, runoff rates had increased due to urban development since the earlier storm. Again, on 26 and 27 December 1969, a slow moving "northeaster" caused severe flooding in the area and most recently, in February 1972, serious flooding occurred in Quincy and Braintree. In addition to major flooding from severe storms, minor flooding of streets and cellars follows nearly every heavy rainfall over the watersheds in the study area.

C. SOCIO-ECONOMIC CONDITIONS

9. LAND USE. - The existing pattern of land use is largely urban in character. The study area reflects trends of the past decade, which has seen a major shift in acceleration of urban growth as heretofore unused properties or those of low economic return are beginning to be utilized. One example is the recent completion of the South Shore Shopping Plaza in Braintree. At present, large tracts of under-utilized land are being developed for residential and commercial activity.

10. POPULATION. - Population indicators of a large area must be considered along with those of the separate communities to appreciate the existing population picture. Quincy, Braintree, and Milton are parts of the economic area designated as the Boston Standard Metropolitan Statistical Area (SMSA). These communities included within the Boston SMSA, are part of the large designation of the Office of Business Economics (OBE) Area including eastern Massachusetts, Rhode Island, and part of New Hampshire. The existing populations and trends of the past decade are shown in the following table based on the U. S. Census.

	Population 1970	Population 1960	% Increase 1960-1970	In/out Migration 1960-1970
Quincy	87,966	87,409	0.6	- 8,506
Braintree	35,050	31,069	12.8	+ 1,141
Milton	27,190	26,375	3.1	+ 1,063
Boston SMSA	2,753,700	2,595,481	0.6	- 68,522
OBE Area	6,404,692	5,668,201	13.0	-

Increases in the population of Quincy and the Boston SMSA occurred despite actual out-migration shown in the decade 1960-70. Braintree recorded a 1.3 annual increase in line with national growth figures. While Quincy's population remained relatively stagnant during the 60's, a recent rise in permit applications, particularly for large scale, multiple unit residential construction, points to a probable rise in population in the near future.

11. EMPLOYMENT AND LABOR FORCE. - Quincy is primarily a manufacturing city although the extent of its retail trade establishes it as an area shopping center. In 1970, an average of 14,100 people were employed in 120 manufacturing establishments. The Quincy plant of General Dynamics Electric Boat Division is the largest single employer in Quincy and one of the nation's most important shipbuilding facilities. The five largest industrial groups in Quincy, based on employment, are: transportation equipment, machinery, electrical machinery, printing and publishing, and food products.

Braintree is an industrial, residential suburb of Boston and Quincy. In 1970, wholesale and retail trade accounted for 43.2 percent of all jobs, manufacturing 30.6 percent, and the service industry 11.4 percent of all those employed.

The Boston SMSA for 1970 showed 22.4-percent of all those employed were in manufacturing and 21.0-percent in wholesale and retail trade. The total labor force is shown below:

	<u>Quincy</u>	<u>Braintree</u>	<u>Boston SMSA</u>
Labor Force 1970*	37,198	11,712	1,184,595

*Note: The very small portion of the Study Area labor force in Milton is omitted for lack of statistical significance.

D. IMPROVEMENTS DESIRED BY LOCAL INTERESTS

12. PUBLIC MEETING. - A public meeting was held on 8 June 1972 at Quincy attended by nearly 100 persons. The large turnout and numerous comments expressed pointed to the public concern about the flood situation. Several speakers urged immediate

construction of flood control improvements. Among expression of specific desires were proposals for regulation of levels of Old Braintree Reservoir to provide downstream flood control. However, owners of shore properties around the reservoir cautioned against excess drawdown which might create adverse effects on the environment. Many speakers urged channel improvement for flood control. Opposition was voiced to further flood plain development with its consequent increase of runoff. Most of the residents were concerned with eliminating flooding and damages to residential properties in low-lying areas. Local, state and Federal officials also expressed concern and proposed plans of improvements.

13. MEASURES TAKEN BY LOCAL INTERESTS. - The City of Quincy appropriated \$200,000 in 1969 for flood control improvements consisting of three new culverts to alleviate flooding near the mouth of Furnace Brook. These funds were matched by an equal amount from the State. Although this work would not provide protection to upstream areas and is therefore not complete within itself, it is a logical area for initiating a program for local flood protection and indicates the desire of the local community to help itself.

The Commonwealth of Massachusetts has also given evidence of concern with the Quincy flood problems by its enactment in 1972 (Chapter 803) to authorize and direct up to \$2 million of Metropolitan District Commission (MDC) expenditures ... "to provide for flood control along the Furnace Brook in that part of Quincy known as West Quincy, Braintree Dam in Braintree, and Town Brook located partly in said Quincy and partly in said Braintree, by constructing any necessary new facilities, and by reconstructing and rehabilitating existing facilities to control the flooding in the areas of these waterways." The MDC has awarded a contract to a consultant for plans and specifications for flood control improvements consisting chiefly of enlarging the size of conduits under major highways at the mouth of Furnace Brook and along Black's Creek estuary, into which Furnace Brook flows.

E. OBJECTIVES OF INVESTIGATION

14. GENERAL. - The basic purpose of the study of the Quincy Coastal Streams is to determine and report to Congress the

advisability of improvements for flood control and allied purposes on Furnace Brook, Hayward Creek, and Town Brook, all coastal streams within the city of Quincy and adjoining towns of Braintree and Milton, Massachusetts. In accomplishing this goal, consideration will be given to finding solutions to immediate and long-range water-related needs of the study area. Equal consideration shall be given to each of the following objectives:

a. National Income. Maintaining or increasing national income may be accomplished through the development of water and related land resources. In accordance with this objective, the present and projected needs will be assessed for flood control, recreation, fish and wildlife, and other elements of water resource development. The annual costs of the measures for these various purposes will be compared against the annual benefits in the interest of selecting projects based on economic efficiency.

b. Regional Development. The national income gains and the additional economic impact will be evaluated on the basis of possible expansion of business, industry, and recreation that could result from a reduction in flood hazards and provision of a more adequate water supply.

c. Environmental Enhancement. The preservation and enhancement of the Nation's environmental resources is essential to insure their availability for future use. The investigation will consider the preservation of natural and cultural areas, creation or restoration of scenic areas, preservation and enhancement of recreational areas, and the rehabilitation and protection of aesthetic values in the study area. In accordance with the National Environmental Policy Act of 1969, all available means will be utilized to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations.

d. Well-Being of the People. The well-being of the greatest number of people shall be the overriding determinant in considering the best use of water and related land resources. Hardship and basic needs of particular groups within the general public shall be of concern but care shall be taken to avoid resource use and development for the benefit of a few or to the disadvantage of many.

15. FLOOD CONTROL NEEDS. - The immediate and critical need of the Quincy Coastal Stream area is for control of floods caused by major storms and by seasonal high water. However, the correction of this need must be supplemented by long-range plans to limit flood plain encroachment and development; otherwise, the amelioration of the present threat may encourage further unwise development. The accelerated runoff and greater potentiality of loss thus created would worsen the situation.

16. EFFECTS ASSESSMENT. - The assessment will cover all environmental, social, and economic effects following the Guidelines established by ER 1105-2-105, to ensure that all significant adverse and beneficial project effects are systematically identified and assessed and the feasibility and cost of eliminating or minimizing adverse effects is taken fully into account. Possibilities of project benefit or adverse project effects on the environment, recreation, and aesthetics of the area have been made apparent by the present stage of the study. Existing enclosure in addition to pollution of waterways has all but destroyed fisheries in these streams. The effects of project enclosures of waterways, especially on two small warm water ponds in the Study Area and the saltmarsh along the adjacent Black's Creek estuary which still provide fishing, will be assessed. The saltmarsh area is of special value because of its location near Boston where few such environmental and aesthetic assets remain. Project encouragement of a developmental trend must also be assessed since the existing demand for developable land could result in unwise use of areas made free of the threat of flooding. On the other hand, proper use and controlled development may produce social benefits attributable to the project.

The resulting decisions and project recommendations will be made in the best overall interests of the public with a balance maintained between elements of dollar benefits and costs, the degree of satisfaction of public needs, and the extent of other types of effects. To accomplish this, the tentative profile of existing conditions obtained from prior studies will be augmented to show projections of conditions with and without the project or alternatives over the life of the project. Significant effects will be identified and evaluated. Any desirable project modification revealed by the assessment will be considered. Survey studies will draw on all

known sources of information for effects assessment. Reference is made to Preliminary Effects Assessment, Quincy, Massachusetts-Coastal Streams, submitted to the Chief of Engineers (DAEN-CWR-L) on 2 October 1972.

17. SELECTED NEEDS AND PROBLEMS. - Solution is to be sought for the problem of flooding in the area. Environmental needs will be considered as they are related to and may be resolved by improvements for flood control. The flood control problems will be treated by individual watershed as little inter-relationship exists between the hydrology of the various streams. Diversion from one watershed to another is not feasible, since all area streams suffer from high flows simultaneously and damages would only be transferred within the area.

18. INITIAL STUDIES. - Initially the study will be guided by the preliminary findings of the Reconnaissance Report and the thoughts and wishes expressed at the public meeting. However, the further studies and extensive consultations with State and local interests may alter this plan strategically. The current priorities for accomplishment of planning are as follows:

- a. Hayward Creek
- b. Furnace Brook
- c. Town Brook

F. PRIOR INVESTIGATIONS AND REPORTS

19. FEDERAL AND NON-FEDERAL. - Hydrologic, topographic, engineering and economic data, available in reports of prior studies, while useful, is of less than the survey scope required for project formulation. The Reconnaissance Report on coastal streams within the city of Quincy, completed by the Corps in 1970, is the most detailed and recent analysis available combining findings of prior studies and recent reconnaissance of the area. A Flood Insurance Study completed by this office in 1970 is also available. Other earlier studies include a 1956 report made for the Commonwealth of Massachusetts by the consulting firm of Charles T. Main and the 1956 report of the New England-New York Inter-Agency Committee (NENYIAC), published as Senate Document No. 14, 85th Congress, 1st Session, and referred to in the authorizing resolution for this study.

G. ECONOMIC STUDIES

20. WATER RESOURCE NEEDS. - Recent studies have found that new development in headwaters areas of Quincy coastal streams has increased the volume of runoff and the existing drainage systems are inadequate to discharge the augmented runoff in times of flood. Furthermore, build-up in the flood plains has magnified potential damages. This has worsened a flood problem that was already of significant proportions. If current trends persist, the problem will become even more acute since the relatively undeveloped headwater areas now providing much natural storage are prime targets for future development. It is planned to make all necessary economic base studies and studies of trends to assess flood control and other water resource needs. Future losses with and without proposed projects will be determined. Formulation of all economically justified improvements for flood control and other water resource needs will include: water supply, flow regulation, pollution abatement, recreation and fish and wildlife conservation. Two small ponds in the study area could be improved to provide good habitat for warm water fishery. Specific proposals for developing resources needs will be reported.

21. TYPES OF IMPROVEMENTS REQUIRED. - Preliminary studies made for the Reconnaissance Report found that structural improvements for flood control would be feasible and necessary in the study area. These included modification of storage reservoirs, channel improvements, concrete box culverts and pipelines. Storage by redesign of dams or regulation of existing water bodies will also be studied for the survey report. Alternatives have yet to be fully investigated and these will be analyzed in detail as studies progress. Non-structural approaches will also be considered to reduce losses and prevent further deterioration of the flood situation.

22. PROCEDURES FOR SELECTION OF IMPROVEMENTS. - Studies will be directed to formulating and analyzing alternatives for consideration and comparison during the planning process. Effectiveness of flood control function and economic feasibility will be judged by the benefit-cost ratio and the principle of maximization in plan formulation of benefits and multiple objectives including national efficiency, regional development, environmental quality and social well-being. Project effects that cannot be incorporated

in the benefit-cost evaluation will be assessed separately in accordance with guidelines of ER 1105-2-105 including environmental, social and economic effects.

23. STUDIES REQUIRED. - Studies will be carried to survey report detail as required by EM 1120-2-101, subject: "Survey Investigations and Reports, General Procedures". Field studies will include hydrology, surveying and mapping, stream regulation, materials and foundations, and real estate. Office studies will cover design and cost estimates, economic, social and environmental studies, plan formulation, effects assessment and other studies necessary for report input. Interim reports will be submitted covering individual watersheds according to the schedule of funding.

H. CONSTRAINTS AND CONTROLS

24. GENERAL. - The study area streams are separate hydrologic entities, and no possibility of beneficial diversion between streams is foreseen. While general data such as economics, precipitation, etc., may be collected on an aggregate basis, all flood control problem solving must be based on discreet watershed characteristics. Problems and needs other than flood control will be incorporated in planning to the extent that they remain supplemental and are not treated as major purposes. The extent of study is limited to survey scope by the authorization.

The study will be phased by watershed in two alternative schedules with Hayward Creek being given priority. Alternative schedule No. 1 is based on the approved transfer of additional funds in FY1973 to cover award of an A/E contract for a survey report on Hayward Creek only. Alternative schedule No. 2 requires that FY1973 funding covers contract award for both Hayward Creek and Furnace Brook. Under Alternative No. 1 the Hayward Creek Report is scheduled for completion in FY1974, the Furnace Brook Report in FY1975 and the entire study in FY1976. Alternative No. 2 would move up the time required to complete the Furnace Brook report to FY1974, and the entire study to FY1975.

Studies on each watershed will be continued only so long as a possibility remains that a workable economically feasible, and

environmentally and socially acceptable project can be recommended.

I. COOPERATION AND COORDINATION

25. LOCAL COOPERATION. - Local cooperation requirements for Federal participation in construction of any project will be detailed in conformance to the policy expressed in EM 1120-2-101. It is expected that local interests will be required to give assurances satisfactory to the Secretary of the Army that they will:

(a) Provide without cost to the United States all lands, easements, and rights-of-way necessary for construction of the project, except as otherwise provided for by the Chief of Engineers;

(b) Hold and save the United States free from damages due to the construction works;

(c) Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army;

(d) Provide without cost to the United States all alterations and replacements of existing utilities including bridges, highways, sewers and railroad modifications and relocations other than bridges and bridge approaches, which may be required for the construction of the project;

(e) Prescribe and enforce regulations to prevent encroachment on both the improved and unimproved channel;

(f) Prohibit encroachment on ponding areas and, if the capacity of these areas is impaired, promptly provide substitute ponding capacity or equivalent pumping capacity without cost to the United States; and

(g) Comply with the requirement specified in Section 210 and 305 of Public Law 91-646, 91st Congress, approved 2 January 1971 entitled, "Uniform Relocation Assistance and Real Property Policies Act of 1970."

26. COORDINATION. - Past coordination with local and State interests aided in reconnaissance of the area and in arranging for the public meeting held in June 1972. Coordination measures are continuing through conference and correspondence. Each phase of the study will be presented for comment or concurrence to other Federal, State, regional, and local agencies engaged in planning or development of water resources in the Study Area. Further coordination is accruing through continued use of a public information program.

J. PUBLIC MEETINGS

27. GENERAL. - The initial public meeting held in June 1972 accomplished much in an educational role, clearing up considerable confusion about the role and work of the Corps, especially concerning need for Congressional authorization for studies involving projects that would exceed the cost limitation under the Section 205 Authority. Formulation stage meetings will be held in the course of interim report preparation for each watershed in order to present the advantages and disadvantages of all alternative solutions developed and to incorporate public views and desires in selection of alternatives and plan formulation. Late stage public meetings will be held before report completion to present the findings of detailed studies, including the rationale for any proposed solution, and the tentative recommendations.

K. SUBMISSION OF REPORTS

28. PLAN OF SURVEY. - This report constitutes the plan of survey.

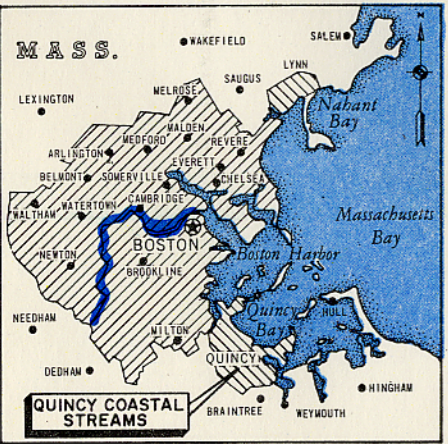
29. INTERIM AND FINAL REPORTS. - Individual interim reports will be submitted on Hayward Creek and Furnace Brook watersheds. The study of Town Brook watershed will be included in the final report of this study. The submission of the individual reports will be determined by the allocation of funds made available as discussed in Section H, "Constraints and Controls."

L. ESTIMATES OF COSTS

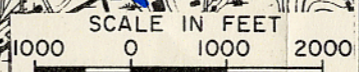
30 GENERAL. - The preparation of budgetary data for the Quincy, Massachusetts-Coastal Streams Survey is predicated upon the estimated amount of money needed to complete the work items considered necessary for a Level C Study.

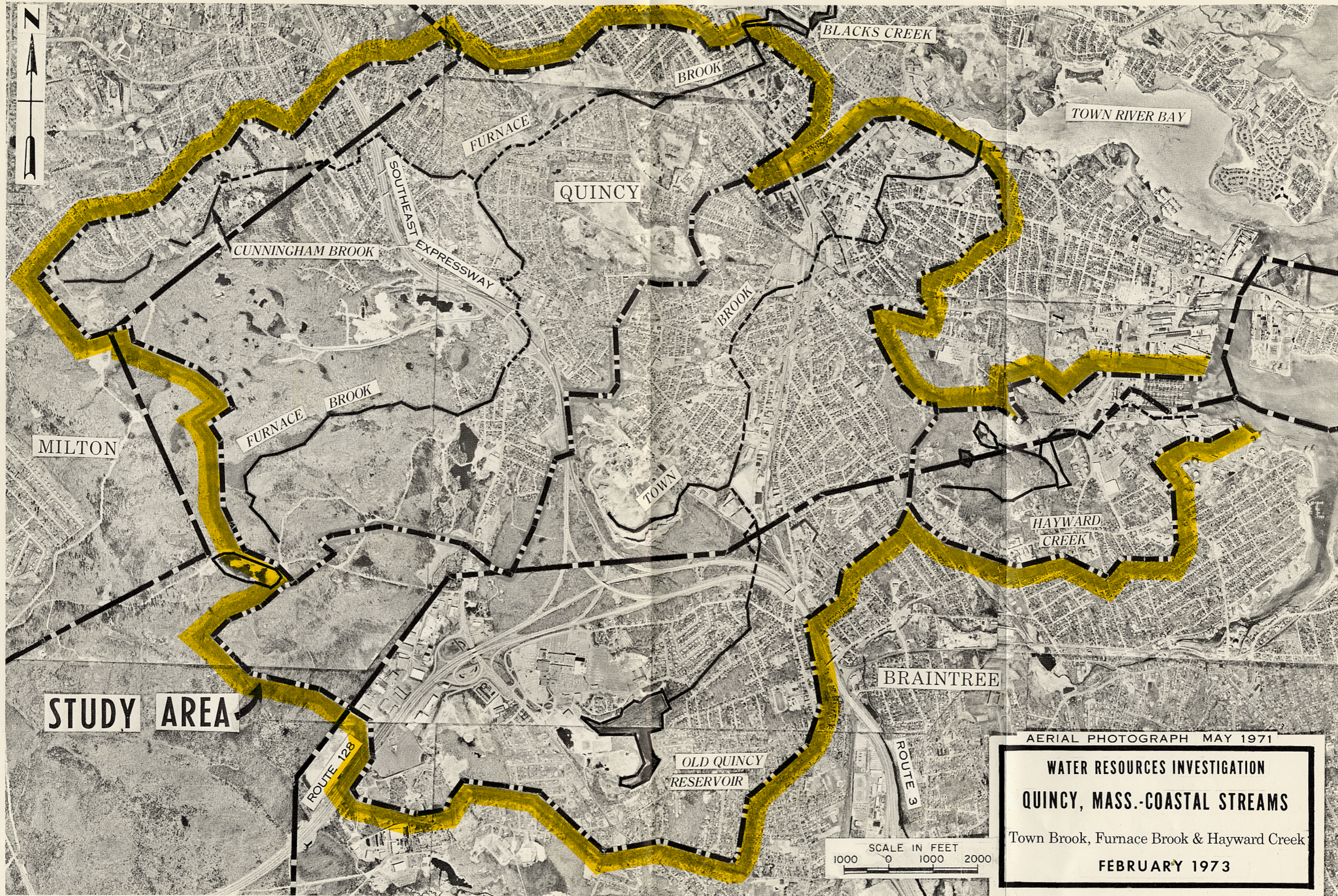
M. RECOMMENDATION

31. TREATMENT RECOMMENDED. - Approval of this Plan of Survey on flood control and allied purposes for Quincy, Massachusetts-Coastal Streams is recommended.



WATER RESOURCES INVESTIGATION
QUINCY, MASS.-COASTAL STREAMS
Town Brook, Furnace Brook & Hayward Creek
JUNE 1972





AERIAL PHOTOGRAPH MAY 1971

**WATER RESOURCES INVESTIGATION
QUINCY, MASS.-COASTAL STREAMS**

Town Brook, Furnace Brook & Hayward Creek

FEBRUARY 1973